

**Abstract**

The present invention relates to methods of immobilizing membrane-associated molecules within a sol-gel matrix. The membrane-associated molecule is embedded in the bilayer of a liposome. The molecule-liposome assembly remains functionally intact when it is immobilized within a protein and membrane-compatible sol-gel derived from polyol silane precursors or sodium silicate. The activity and stability of the entrapped membrane-associated molecule was significantly improved in macroporous silica.